

Engineer Specification

Model No.: ST-HB15AGX

Customer: _____

Approved by: _____

Note:

System Integrator	QA	Safety	RD	Product Manager
Approval	Approval	Approval	Approval	Approval

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REVISION HISTORY

Version	Date	Section	Description
01	May. 23, '05	-	ST-HB15AGX Specification was first issued.
02	Aug. 16, '06	-	P4 : 1.2 FEATURES ADD : RoHS Compliance
03	April. 16, '07		Update Page. 22. 23 Dimension List.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

ST-HB15AGX is a 15.0" TFT Liquid Crystal Display monitor with 2 CCFL Backlight units. This monitor supports 1024 x 768 XGA mode and can display 16.2M colors.

1.2 FEATURES

- 15" XGA TFT LCD Panel
- TN Mode Liquid Crystal
- D-SUB/ DVI-D Input
- Audio Function
- Panel support operating wide temperature
- Support to 75Hz Refresh Rate
- Support VESA-DCC 2B plug & play function
- Support VESA-DPMS / DVI DMPM Power Management Function
- High Brightness & Contrast Ratio
- High Brightness & Contrast Angular Dependent
- Fast LC Response Time
- Light Weight
- RoHs Compliance

1.3 APPLICATIONS

Direct view LCD flat panel display

1.4 GENERAL SPECIFICATIONS

Item		Specification	Unit
LCD panel	Active Area	304.128 (H) x 228.096 (V) (15.0" diagonal)	mm
	Driver Element	a-si TFT Active Matrix	-
	Pixel Number	1024 x R.G.B. x 768	pixel
	Pixel Pitch	0.297 (H) x 0.297 (V)	mm
	Pixel Arrangement	RGB Vertical Stripe	-
	Display Color	16.2M	color
	Trans-missive Mode	Normally White	-
	Viewing Angle (H / V)	160 / 160	degree
	Brightness	400	cd/m ²
	Contrast Ratio	700	-
	LC Response Time (Tr+Tf)	25 (Tr: 8 + Tf: 17)	msec
Graphic	Interface Sync.	LVDS Level	-
	Horizontal Sync.	Positive / Negative	-
	Vertical Sync.	Positive / Negative	-
	Input Connector	D-Sub 15 pin / DVI-D 24 pin	-
Performance	Auto Adjust	Clock, Phase, H Position & V Position	-
	Screen Scaling	VGA/SVGA/XGA Full Screen Display	-
	Power Management	VESA DPMS, DVI DMPM (Optional)	-
	Color Adjustment	User, 6500K, 9300K	-
	OSD Language	English, French, Spanish, Italian, Japanese, Traditional Chinese, Simplified Chinese, Deutsch	-
Power source	Power Input	AC100~240 (Worldwide)	V
Power consumption	Operation Mode	33	W
	Power Saving Mode	≤3	W
Physical	Dimension, weight	359(W) x 56 (D) x 254.75 (H), (4)	mm, kg
DCC	Plug & Play	DDC 2B Compliance	-
Function	OSD key	6	key
B/L MTBF	TPY 50000Hrs (equal to CCFL Half Luminance Life, at 25±2°C, Lamp Current under 5 mArms)		

Note The optical specification is based on CMO panel specification.

2. PANEL ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-40	+80	°C	(0) ,(1)
Operating Ambient Temperature	T _{OP}	-30	+70	°C	(0) ,(1), (2)

Test Item	Test Condition	Note
High Temperature Storage Test	80°C, 240 hours	(1),(2)
Low Temperature Storage Test	-40°C, 240 hours	
Thermal Shock Storage Test	-40°C, 0.5hour \longleftrightarrow 80°C, 0.5hour; 100cycles, 1hour/cycle	
High Temperature Operation Test	70°C, 240 hours	
Low Temperature Operation Test	-30°C, 240 hours	
High Temperature & High Humidity Operation Test	60°C, RH 90%, 240hours	
Heat Cycle Operation Test	-30°C, 1hour \longleftrightarrow 70°C, 1hour; 50cycles, 4hour/cycle	
ESD Test (Operation)	150pF, 330Ω, 1sec/cycle Condition 1 : panel contact, ±8KV Condition 2 : panel non-contact ±15KV	(2)
Shock (Non-Operating)	50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z direction	(2),(3)
Vibration (Non-Operating)	1.5G, 10 ~ 500 Hz sine wave, 1.5mm Max, 30min/cycle, 1 cycles each X, Y, Z direction	(2),(3)

Note (0) All test conditions are as above table.

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

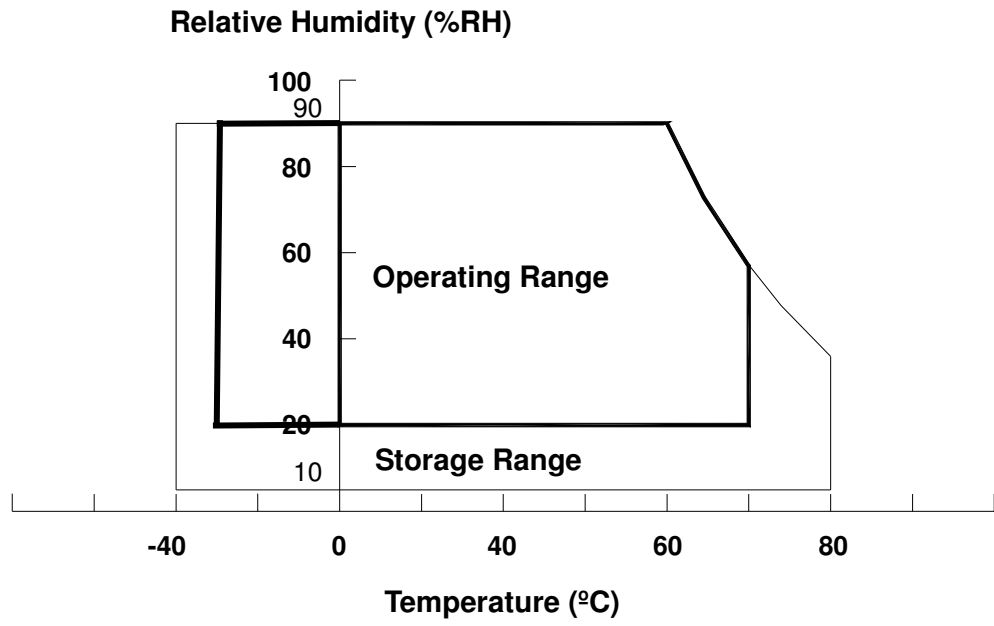
(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

(c) No condensation of water.

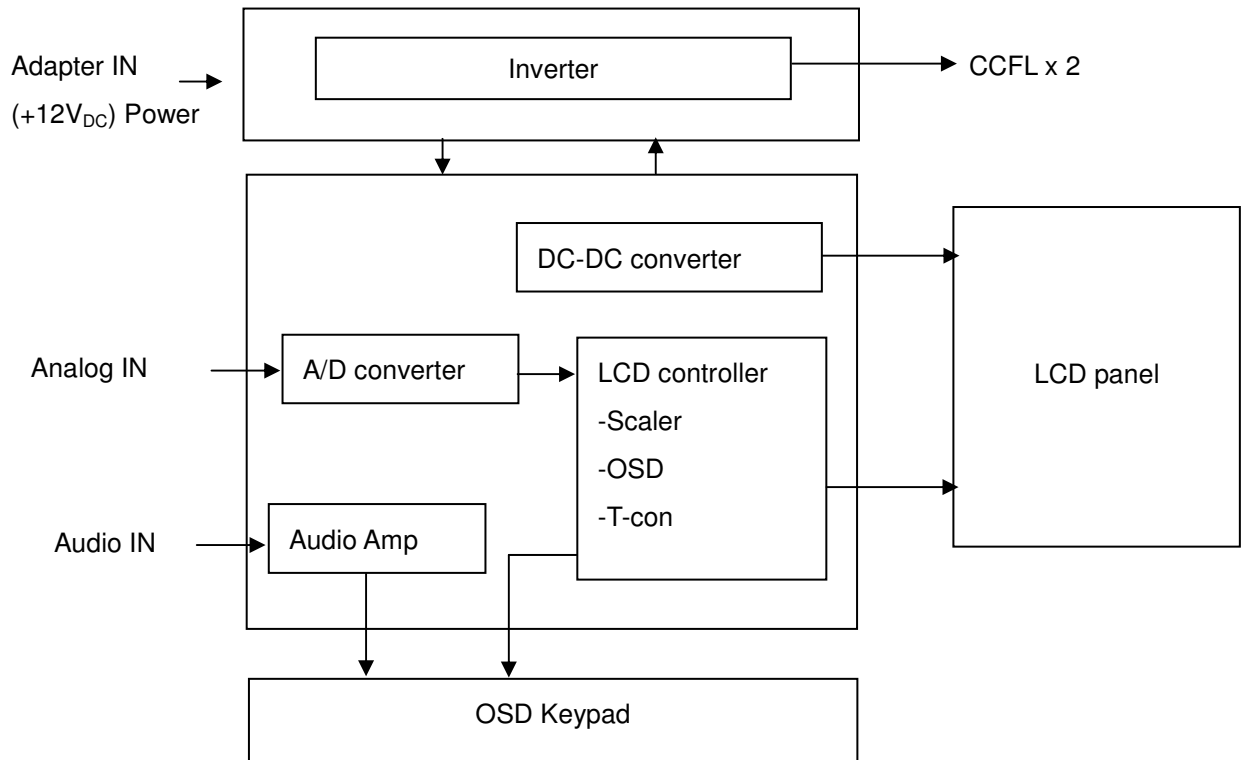
Note (2) No display malfunctions.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) Temperature of panel display surface area should be 80°C Max.

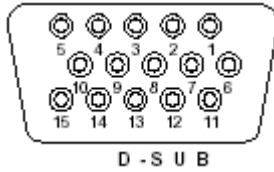


3. BLOCK DIAGRAM



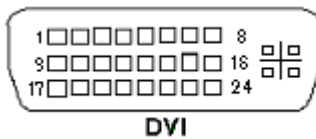
4. INTERFACE PIN CONNECTION

4.1 D-SUB PIN ASSIGNMENT



Pin No.	Pin Function	Pin No.	Pin Function
1	Red video input	9	NC
2	Green video input	10	Ground
3	Blue video input	11	No connection
4	NC	12	(SDA)
5	Ground	13	Horizontal sync (Composite sync)
6	Red video ground	14	Vertical sync
7	Green video ground	15	(SCL)
8	Blue video ground		

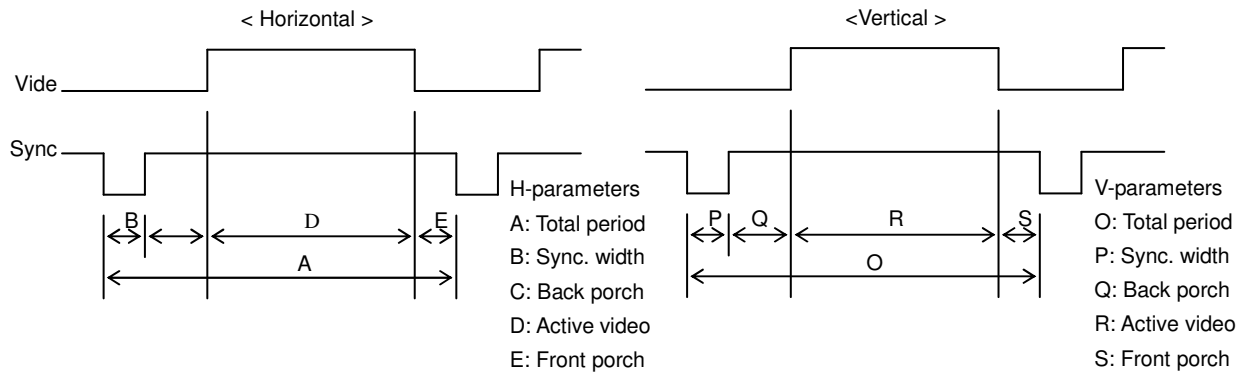
4.2 DVI- 24PIN CONNECTOR



Pin No.	Pin Function	Pin No.	Pin Function
1	T.M.D.S Data 2-	13	NC
2	T.M.D.S Data 2+	14	NC
3	T.M.D.S Data 2 Ground	15	Ground
4	NC	16	Hot Plug Detect
5	NC	17	T.M.D.S Data 0-
6	Clock line (SCL)	18	T.M.D.S Data 0+
7	Data line (SDA)	19	T.M.D.S Data 0 Ground
8	NC	20	NC
9	T.M.D.S Data 1-	21	NC
10	T.M.D.S Data 1+	22	T.M.D.S Clock Ground
11	T.M.D.S Data 1 Ground	23	T.M.D.S Clock+
12	NC	24	T.M.D.S Clock-

5. EDID CODE ADDRESS

(00-07)	EDID Header
(08-09)	ID Manufacturer Name
(10-11)	Product ID Code
(12-15)	Last 5 Digits of Serial Number
(16)	Week of Manufacture
(17)	Year of Manufacture
(10-17)	Complete Serial Number
(18)	EDID Version Number
(19)	EDID Revision Number
(20)	VIDEO INPUT DEFINITION: Analog Signal 0.700, 0.300 (1.000 Vp-p) Blank-to-Black Setup, Separate Syncs
(21)	Maximum Horizontal Image Size
(22)	Maximum Vertical Image Size
(23)	Display Gamma
(24)	Power Management and Supported Feature(s): Stand-By, Suspend, Active Off/Very Low Power, Preferred Timing Mode Display Type = R/G/B Color
(25-34)	CHROMA INFO:
(35)	ESTABLISHED TIMING I: 720 X 400 @ 70Hz (IBM,VGA) 640 X 480 @ 60Hz (IBM,VGA) 640 X 480 @ 72Hz (VESA) 640 X 480 @ 75Hz (VESA) 800 X 600 @ 56Hz (VESA) 800 X 600 @ 60Hz (VESA)
(36)	ESTABLISHED TIMING II: 800 X 600 @ 72Hz (VESA) 800 X 600 @ 75Hz (VESA) 832 X 624 @ 75Hz (Apple, Mac II) 1024 X 768 @ 60Hz (VESA) 1024 X 768 @ 70Hz (VESA) 1024 X 768 @ 75Hz (VESA)
(37)	Manufacturer's Reserved Timing:
(38-53)	Standard Timing Identification:
(54-71)	Detailed Timing / Descriptor Block 1:
(72-89)	Detailed Timing / Descriptor Block 2: Monitor Serial Number:
(90-107)	Detailed Timing / Descriptor Block 3: Monitor Range Limits:
(108-125)	Detailed Timing / Descriptor Block 4: Monitor Name:
(126)	No Extension EDID Block(s)
(127)	Check Sum

6. COMPLIANT TIMING


Item	Video Mode		fH (kHz)	fV (Hz)	Dot clock (MHz)	Sync		Horizontal (μ sec)					Vertical (msec)					Analog	Digital
						polarity		A	B	C	D	E	O	P	Q	R	S		
						H	V												
1	VESA	VGA 640x480	31.469	59.940	25.175	N	N	800	96	48	640	16	526	2	33	480	11	<input type="radio"/>	<input type="radio"/>
2			37.861	72.809	31.500	N	N	832	40	128	640	24	520	3	28	480	9	<input type="radio"/>	<input type="radio"/>
3			37.500	75.000	31.500	N	N	840	64	120	640	16	500	3	16	480	1	<input type="radio"/>	<input type="radio"/>
4		SVGA 800x600	35.156	56.250	36.000	P	P	1024	72	128	800	24	625	2	22	600	1	<input type="radio"/>	-
5			37.879	60.317	40.000	P	P	1056	128	88	800	40	628	4	23	600	1	<input type="radio"/>	<input type="radio"/>
6			48.077	72.188	50.000	P	P	1040	120	64	800	56	666	6	23	600	37	<input type="radio"/>	<input type="radio"/>
7			46.875	75.000	49.500	P	P	1056	80	160	800	16	625	3	21	600	1	<input type="radio"/>	<input type="radio"/>
8		XGA 1024x768	48.363	60.004	65.000	N	N	1344	136	160	1024	24	806	6	29	768	3	<input type="radio"/>	<input type="radio"/>
9			56.476	70.069	75.000	N	N	1328	136	144	1024	24	806	6	29	768	3	<input type="radio"/>	<input type="radio"/>
10			60.023	75.029	78.750	P	P	1312	96	176	1024	16	800	3	28	768	1	<input type="radio"/>	<input type="radio"/>
11	VGA TEXT	720x400	31.469	70.087	28.322	N	P	900	108	45	720	27	449	2	35	400	12	<input type="radio"/>	<input type="radio"/>
12	Macintosh	640x480	35.000	66.667	30.240	N	N	864	64	96	640	64	525	3	39	480	3	<input type="radio"/>	-
13		832x624	49.725	74.500	57.283	N	N	1152	64	224	832	32	667	3	39	624	1	<input type="radio"/>	-
14		1024x768	60.150	74.720	80.000	N	N	1330	96	168	1024	42	805	3	31	768	3	<input type="radio"/>	-

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITION

Item	Condition
Temperature	Normal room temperature (25±2°C)
Humidity	50±10%
AC input voltage	100V±2V, 120±2V, 60Hz / 240±2V, 50Hz
Brightness	Maximum with OSD setting
Contrast	Middle with OSD setting
Resolution setting	1280 x 1024 @60Hz
Color temperature	With OSD setting
Measuring instrument	Topcon luminance colorimeter BM-5A or equivalent
Others	Before measuring, "Auto Adjust" & "Auto Balance" must be done in advance

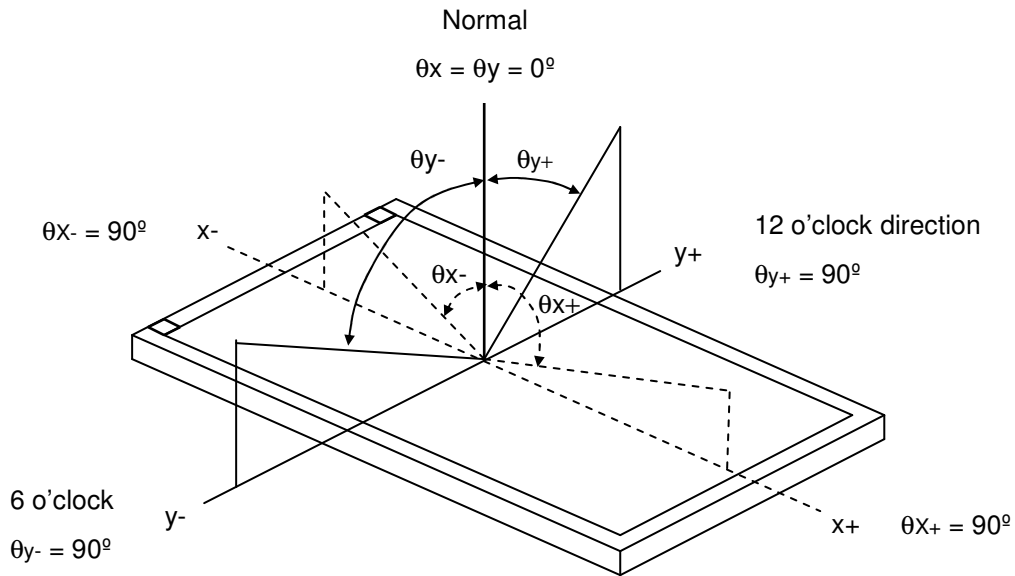
7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 4.2. The following items should be measured under the test conditions described in 4.1 and stable environment shown in Note (4).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	(480)	(700)	-	-	(2), (4)
Response Time		T_R		-	(8)	(13)	ms	(3)
		T_F		-	(17)	(22)	ms	
Luminance of center point		L		(400)	(450)	-	cd/m ²	(2), (4)
Brightness Uniformity		Uni.	-	(1.25)	(1.4)	-	(2), (4)	
Color Chromaticity	White	W_x		(0.283)	(0.313)	(0.343)	-	(2)
		W_y		(0.299)	(0.329)	(0.359)	-	
Viewing Angle	Horizontal	θ_{x+}	CR ≥10	70	80	-	Deg.	(1), (4)
		θ_{x-}		70	80	-		
	Vertical	θ_{x+}		70	80	-	-	
		θ_{x-}		70	80	-		

Note The optical specification is based on CMO panel specification.

Note (1) Definition of Viewing Angle (θ_x, θ_y):



*TN type has Gray scale inversion occurs at $\theta_{y-}=40^\circ$

Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression and figure below.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

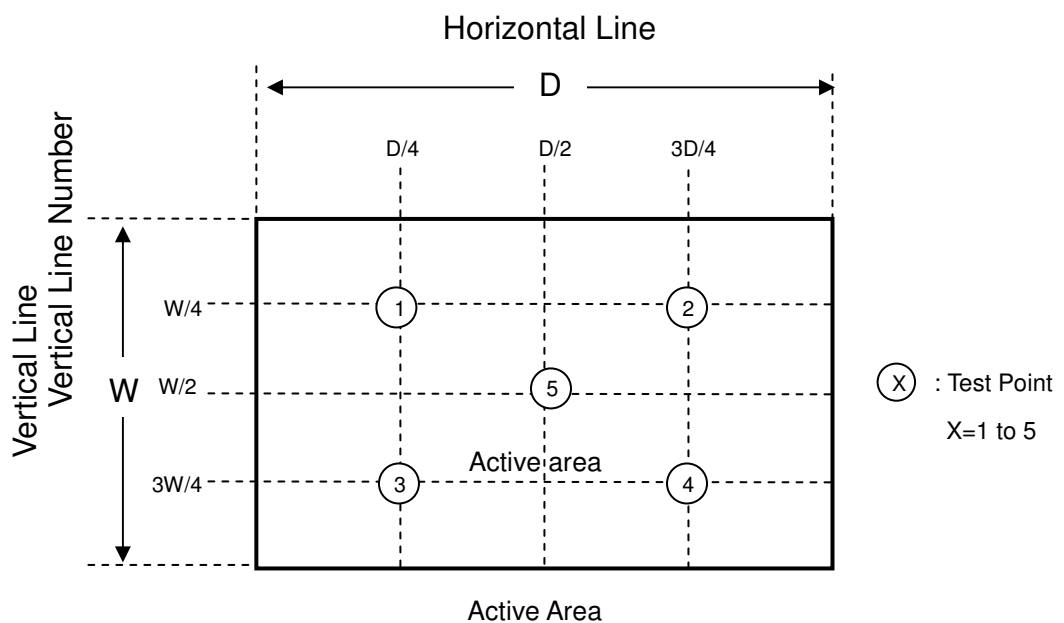
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

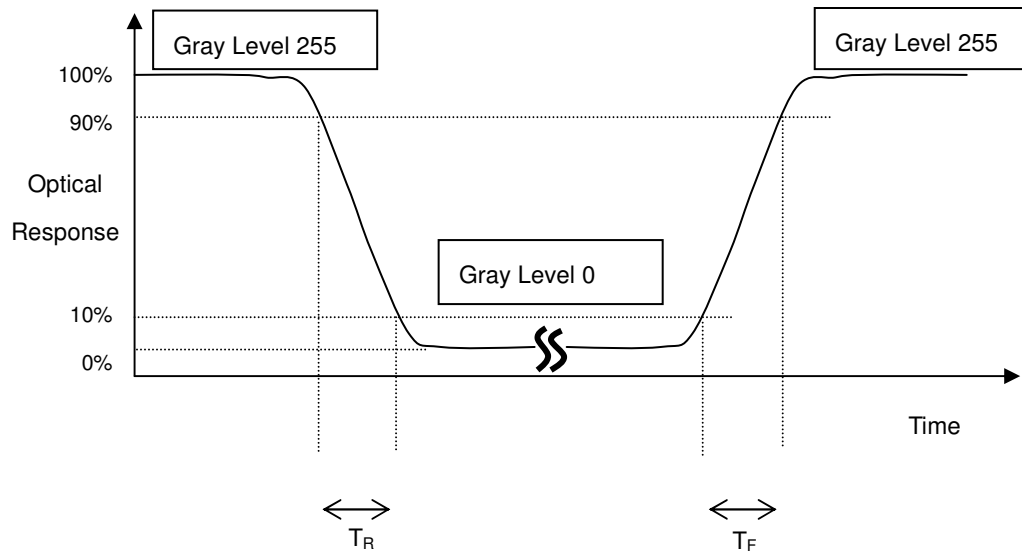
$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Definition of luminance measured points:

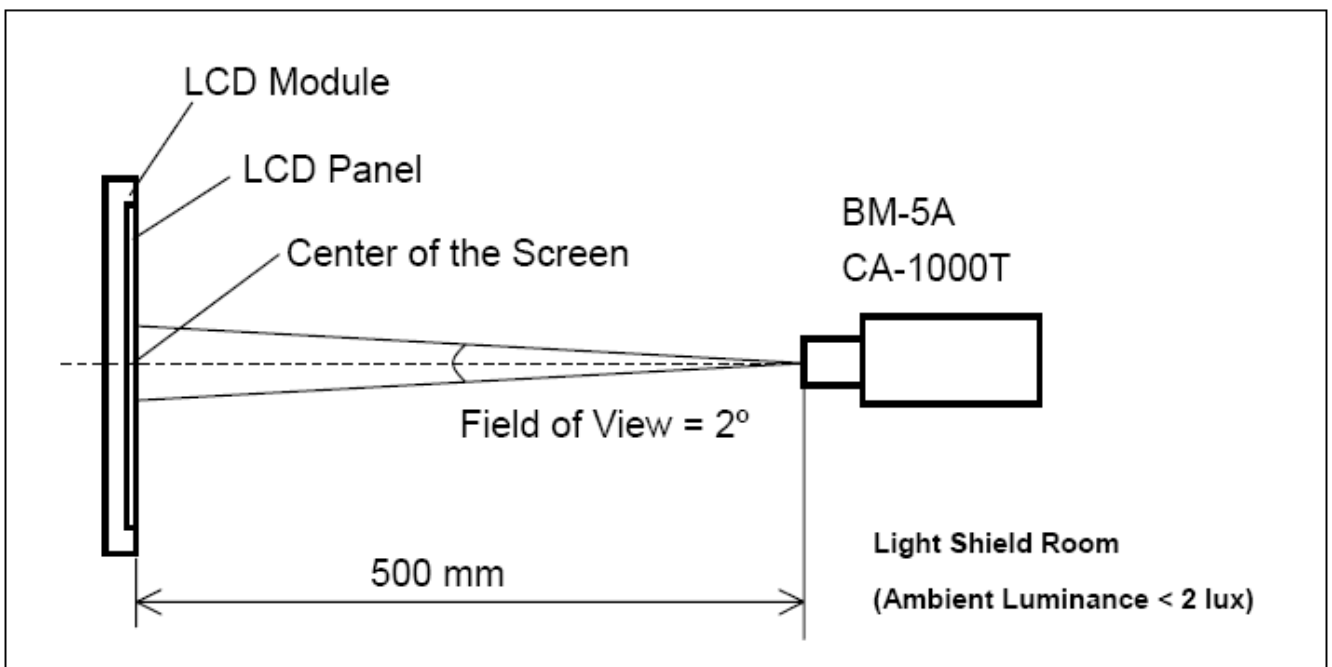


Note (3) Definition of Response Time (T_R , T_F):



Note (4) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (5) Definition of Luminance of White (L_C , L_{AVE}):

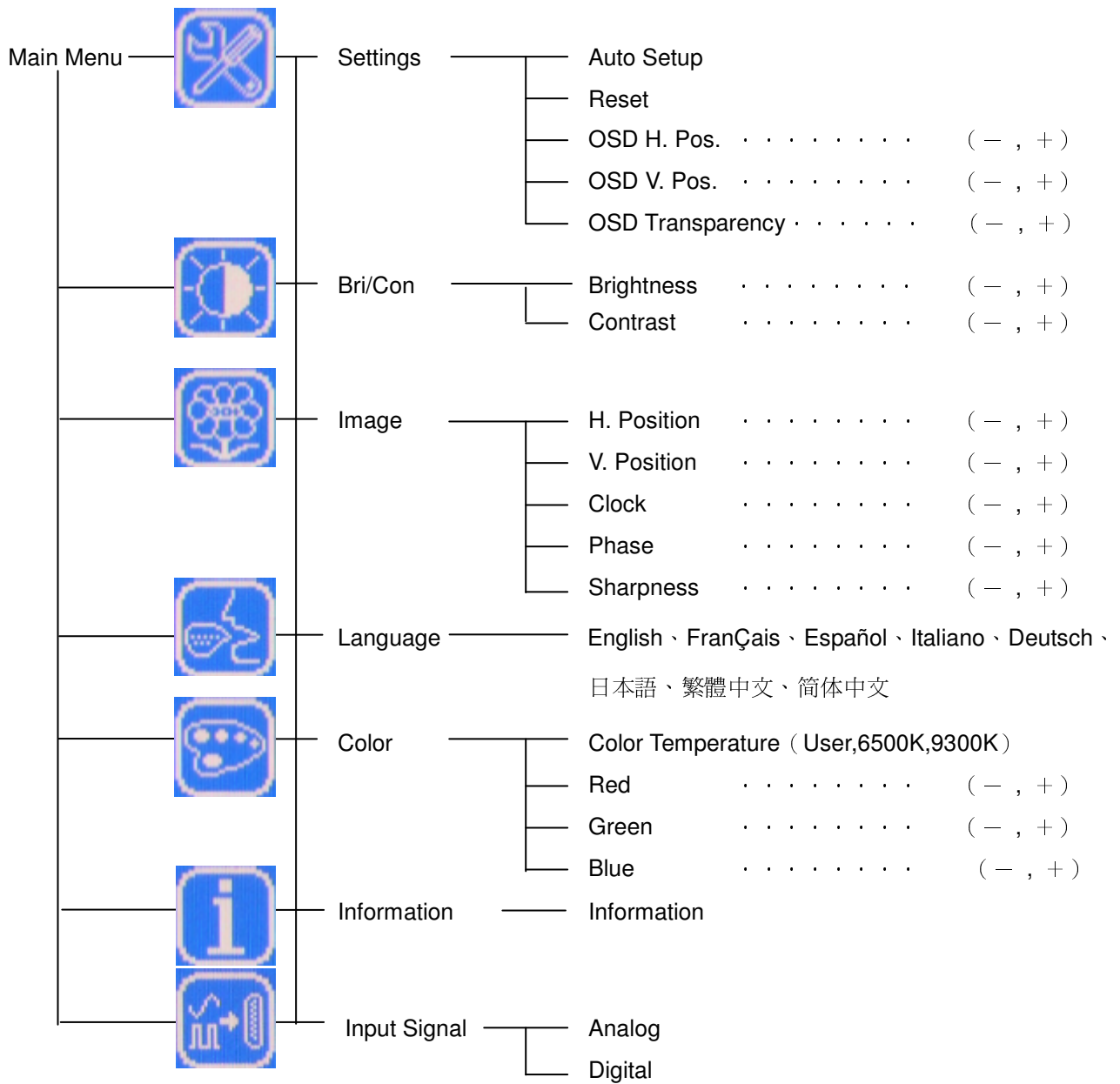
Measure the luminance of gray level 255 at center point and 5 points

$$L_C = L(5)$$

$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

$L(x)$ is corresponding to the luminance of the point X at the figure in Note (2).

8. DISPLAY SETTING

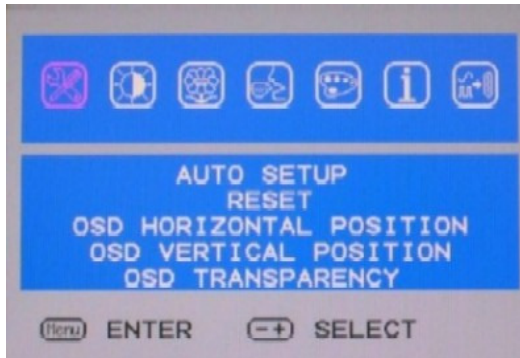


8.1 OSD FUNCTION DEFINE

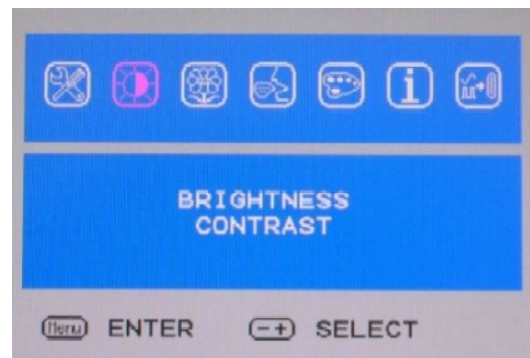
No.	Key	Descriptions
1	POWER	Power On/Off
2	AUTO / EXIT	Automatically optimize positions, phase & clock when OSD is not shown Exit the OSD menu when OSD is shown
3	VOLUME	Adjustment volume
4	+	Selection or adjustment when OSD is shown/Quick brightness adjustment
5	-	Selection or adjustment when OSD is shown/Quick contrast adjustment
6	MENU	Enter OSD/Access sub-menu & selection

8.2 OSD DISPLAY EXAMPLES

Settings



Bri / Con



Image



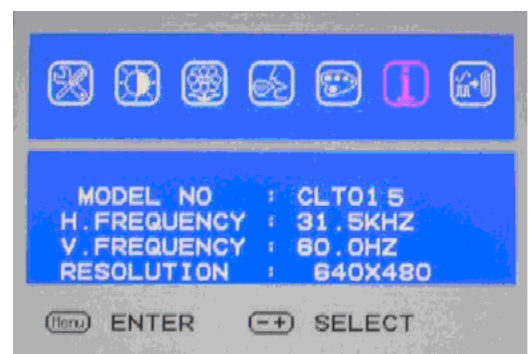
Language



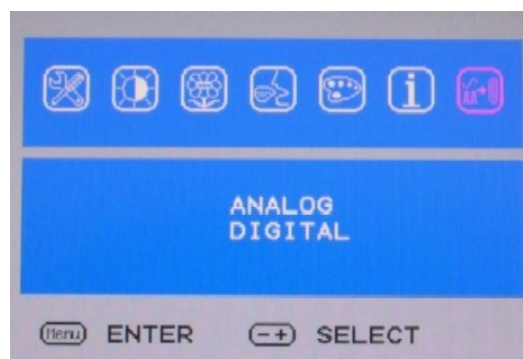
Color



Information



Input Source



9.ACCESSORIES

9.1 ADAPTOR



9.2 POWER CORD(CEE)



9.3 D-SUB 15PIN CABLE



9.4 DVI-D 24PIN CABLE



10. PRECAUTIONS

10.1 HANDLING PRECAUTIONS

- a) Be sure power supply is turned off when inserting or disconnecting the cable.
- b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- c) Since the front polarize is sensitive and can easily be damaged, pay attention not to scratch it.
- d) Since contact with water may cause discoloration or spots, wipe off water drop immediately.
- e) When clean the panel surface, wipe it with absorbent cotton or other soft cloth.
- f) The panel is made of glass, which it may break or crack if dropped or bumped on hard surface. Handle with extra care.
- g) Since CMOS LSI is used in this module, take care of static electricity and handle with caution.
- h) Make sure the four mounting holes of the module are grounded sufficiently. Take electro-magnetic interference (EMI) into consideration.
- i) The module has some printed circuit boards (PCBs) on the backside. Take caution and avoid form any pressure when handling or installing the module; otherwise some of electronic parts on the PCBs may be damaged.
- j) Observe all other precautionary requirements in handling components.
- k) Avoid constantly adding pressure onto the module from rear side, due to it would causes display non-uniformity issue, functional defect, etc.
- l) When handling LCD modules and assembling them into cabinets, please noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. May cause corrosion and discoloration of the LCD modules.
- m) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- n) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- o) Do not pull the I/F connector in or out while the module is operating.
- p) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- q) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.
- r) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- s) Do not disassemble the module.
- t) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

10.2 SAFETY PRECAUTIONS

- (1) The startup voltage of the backlight is over 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

11. DIMENSION

